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COMPLETE SPECIFICATION

Method of Making Decorative Thermoplastic Materials

We, THE DUNLOP COMPANY LIMITED (formerly Dunlop Rubber Company Limited), a British Company of Dunlop House, Ryder Street, St. James's, London, S.W.1. (formerly of 1, Albany Street, London, N.W.1.) do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to a method of making decorative thermoplastic materials and particularly to a method of making decorative flock-coated mats such as car mats.

Accordingly the invention provides a method of making a decorative thermoplastic material which comprises supporting a body of thermoplastic material having a surface to be decorated disposed uppermost and in a substantially horizontal position, spreading over the horizontal surface of the material a layer of particles of a thermoplastic resin composition, applying thereto under pressure a heated patterned tool, cooling and removing unattached particles.

The particles of thermoplastic resin composition are preferably of a colour different from that of the body of thermoplastic material.

Removal of excess thermoplastic resin over that required to give the pattern can be accomplished by any suitable means such as by brushing, by blowing or by means of suction.

The body of thermoplastic material can be any flexible or rigid sheet material, for example, rubber compositions and synthetic resin compositions such as polyvinyl chloride compositions.

In a preferred form of the invention the said body of thermoplastic material comprises the flock of a flock-coated material. Preferred flock materials are fibres of nylon and of polyethylene terephthalates. Such thermoplastic fibres when mixed with fibres which are not thermoplastic are also suitable.

Generally the material carrying the flock can be any flexible or rigid sheet material, for example, rubber compositions and textile materials.

The patterned tool may suitably consist of a flat metal plate having attached at right angles thereto metal strips all of the same depth and of such shape that they produce the pattern required, or the mechanical equivalent of such a structure. The strips can for instance suitably be in the form of circles, ellipses, squares or rectangles but are not limited to such shapes. The pattern can alternatively take the form of for example the name, the initials or a registered design of the manufacture of the article or of the firm using the article in a composite product.

Suitable particles of thermoplastic resin in powder form which can be used in the practice of this invention include cellulose acetate powder, powdered polyethylene and polyvinyl resin compositions, such as polyvinyl chloride compositions, having incorporated therein colouring agents and/or plasticizers and/or stabilizers and/or fillers as required.

In one method in accordance with the invention an assembly comprising the powder-covered thermoplastic material with the tool resting thereon, is placed between

[*Price 4s. 6d.*]

the electrodes of a high frequency electric welding machine, pressure is applied by reducing the separation between the electrodes of the machine, and the tool and resin are heated by establishing a high frequency alternating electrostatic field between the electrodes, the thermoplastic powder lying therebetween is fused, preferably the electrodes are allowed to cool and are then separated and the tool removed. The electrostatic field is usually established for a period of from 2 to 20 seconds and then the electrodes are allowed to cool also in about 2 to 20 seconds before separating the electrodes and removing the tool.

In a further method in accordance with the invention the tool can first be heated, for example in an oven, or by means of gas jets or embedded electric heaters, or by passing through a heated fluidised bed, preferably to a temperature of from 130°C. to 170°C. and the heated tool applied to a thermoplastic material having a covering of resin particles.

The invention will now be illustrated in the following examples.

Example I

A cured basic sheet (12 inches × 10 inches) of a rubber composition, to which there had been attached electrostatically a pile of green nylon flock using a polychloroprene latex adhesive, was placed horizontally with flock uppermost, a thin uniform layer of powdered cellulose acetate composition, coloured red, spread thereon and a patterned tool placed in position having the patterned side on the pile. The assembly was then located between the electrodes of a three kilowatt high frequency electric welding machine and the upper electrode brought down to press on the tool; the high frequency field was then generated for a period of 15 seconds. The nylon flock was softened and the cellulose acetate fused to form a pleasing red pattern on top of the green flock but below the general level of the flock coating. The sheet was allowed to cool and the excess cellulose acetate powder was removed.

Example II

A cured basic sheet of a rubber composition having a pile of red rayon flock was placed horizontally with flock uppermost and a thin uniform layer of a white plasticised polyvinyl chloride powder was spread thereon. A tool having the required pattern was heated in an oven to 150°C. and then placed in position having the patterned side on the pile. Pressure was applied on the tool for 10 seconds and then the tool was removed and the flock-coated material freed from the excess of the powdered resin. The effect produced on the flock-coated material was similar to that obtained by the use of the high frequency electric field, as in Example I.

Example III

An equally pleasing pattern to those of the previous examples was obtained by the use of a brown nylon flock-covered cured rubber composition thinly spread with a red plasticised polyvinyl chloride powder followed by the application of a tool, previously heated to 150°C., for 15 seconds under pressure.

Example IV

A red plasticised polyvinyl chloride powder (which passed through sieve No. 52 of the Fine Mesh British Standard No. 410—1943) was uniformly spread on the surface of a block moulded plasticised polyvinyl chloride mat, 10 inches by 8 inches, to be used as a wear resistant panel on a car mat.

A metal tool which consisted of an oblong brass plate (3 inches by 1.5 inches) of uniform thickness, but having centrally-situated parts removed in the shape of the letter "C", was placed with the design of the tool in contact with the red powder covering the black thermoplastic material and in the electrode system of a 3 kilowatt high frequency electrostatic welding machine: pressure was applied by reducing the separation between the electrodes. A high frequency alternating electrostatic field was established between the electrodes for a period of 10 seconds and by this means the portion of the tool in contact with the red powder softened not only the red powder but the black polyvinyl chloride beneath. After allowing to cool for 10 seconds the tool was removed and the excess red powder which had not fused was brushed off. In the resultant product the letter "C" was black on a red oblong situated, slightly indented, in the black mat and enhanced the appearance of the mat.

Example V

A sheet of black plasticised polyvinyl chloride, 0.04 inch thick, in a substantially horizontal position, was covered by uniformly spreading thereon a powder of red plasticised polyvinyl chloride of the type used in Example IV. A tool was prepared from a metal ring of rectangular cross-section having an outside diameter of 1.5 inches and an inside diameter of 1.42 inches: the tool was heated in an oven to 150°C. and applied for a period of 25 seconds to the powder-covered polyvinyl chloride sheet. The tool was removed and the excess red powder brushed off the black sheet, leaving a red annulus of 1.5 inches diameter and 0.04 inch thick welded in the black sheet.

WHAT WE CLAIM IS:—

1. A method of making a decorative thermoplastic material which comprises supporting a body of thermoplastic material having a surface to be decorated disposed uppermost and in a substantially horizontal position, spreading over the horizontal surface of the material a layer of particles of a thermoplastic resin composition, applying thereto under pressure a heated patterned tool, cooling and removing unattached particles.

2. A method according to claim 1, wherein the particles of a thermoplastic resin composition consist of a plasticised polyvinyl chloride powder.

3. A method according to claim 1, wherein the particles of a thermoplastic resin composition consist of a powdered cellulose acetate composition.

4. A method according to any one of claims 1 to 3, wherein the body of thermoplastic material is a sheet material of a synthetic resin composition.

5. A method according to any one of the preceding claims, wherein the body of thermoplastic material is a plasticised polyvinyl chloride sheet material.

6. A method according to any one of claims 1 to 3, wherein the body of thermoplastic material is the flock of a flock-coated material.

7. A method according to claim 6, wherein the flock is of nylon fibres.

8. A method according to any one of the preceding claims wherein an assembly comprising the powder-covered thermoplastic material with the patterned tool resting thereon, is placed between the electrodes of a high frequency electric welding machine, pressure is applied by reducing the separation between the electrodes of the machine, and the tool and resin are heated by establishing a high frequency alternating electrostatic field between the electrodes, the thermoplastic powder lying therebetween is fused, the electrodes are allowed to cool and are separated and the tool removed.

9. A method according to claim 8, wherein the electrostatic field is established between the electrodes for a period of from 2 to 20 seconds and then the electrodes are allowed to cool for a period of about 2 to 20 seconds.

10. A method according to any one of claims 1 to 7, wherein the tool is heated to a temperature of from 130°C. to 170°C. and then applied to the thermoplastic resin particle layer covering the body of thermoplastic material.

11. A method of making decorative thermoplastic material substantially as described herein with reference to the foregoing examples.

12. A decorative thermoplastic material made by the method of any one of the preceding claims.

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